

REMARKS

As a preliminary matter, the Examiner provided several rejections based on the Chen et al. '380 reference. Applicants believe that the Examiner was referring to the Chen et al. '890 reference, and have responded accordingly in this Amendment. As a further preliminary matter, Applicants amended claim 12 as suggested by the Examiner to delete "of" and insert "or" in line 3. Withdrawal of the objection to claim 12 is respectfully requested.

Claims 1-3, 5, 9 and 12 stand rejected under § 103 on the basis of Chen et al. (U.S. Patent No. 6,120,890), Cheng et al. (U.S. Patent No. 6,361,859), and Ishikawa et al. (U.S. Patent No. 5,815,343). Applicants traverse the rejection because there is no explicit suggestion in the references to combine them to obtain the present invention, which recites, among other things, a H_c ratio of a perpendicular coercive force $H_{c\perp}$ to a horizontal coercive force $H_{c\parallel}$ that is not more than 0.22. In addition, none of the references, alone or in combination, address the problem solved by the present invention (*i.e.* improved shock resistance and durability without reduction of S/N ratio), let alone suggest the claimed solution to those problems.

More specifically, when a glass substrate is used in a magnetic recording disk, there are many unavoidable problems, which include: a difficulty in orientating a C-axis of the Co-based magnetic layer toward an areal direction; an increase in a grain size of the Cr underlayer upon areal orientation of the C-axis; a difficulty in texturing of the surface of the glass substrate and thus generation of a peripheral anisotropy of the magnetic layer; and a

high level of noise and thus low S/N ratio due to poor peripheral anisotropy of the magnetic layer.

In contrast, the present invention is based on a novel combination of features which include: a glass substrate; a sputtered NiP underlayer; texturing of a surface of the NiP underlayer; a Cr underlayer between the glass substrate and the NiP layer; and a sputtered CoCr-based magnetic layer containing at least 14 at% of Cr.

In addition, a feature of the present invention, as recited in amended claim 1, is that a Hc ratio of a perpendicular coercive force $H_{c\perp}$ to a horizontal coercive force $H_{c\parallel}$ is not more than 0.22. Support for this claim amendment is based on Applicants' disclosure page 39, line 21 to page 40, line 17. In particular, the incorporation of the NiP underlayer in the specific structure of the magnetic recording disk of the present invention is particularly effective to reduce the perpendicular coercive force $H_{c\perp}$ and thereby increase the recording density of the disk. The reduced perpendicular coercive force $H_{c\perp}$ is obtained by removing any adverse effects of the glass substrate on the perpendicular coercive force by use of the NiP underlayer, and by the combination of the effects provided by the NiP and CrMo underlayers as well as the mechanical texture structure of the NiP underlayer. Applicants submit that none of the cited references teach this feature due to differences in the structure of the magnetic disk.

That is, when a magnetic layer is directly sputtered on the glass substrate, there arises an increase of the grain size in the magnetic layer, thus causing an increase of the

noise. To prevent an increase of the noise in the magnetic layer, the NiP underlayer is sputtered between the glass substrate and the magnetic layer. However, sputtering of the NiP underlayer only is not sufficient to solve the above problems, and thus, according to the present invention, a surface of the NiP underlayer is textured. Further, in the texturing of the NiP underlayer, it is necessary to previously increase an adhesion power between the glass substrate and the Nip underlayer. To achieve this object, according to the present invention, a Cr underlayer is sputtered between the glass substrate and the NiP underlayer. In this manner, the Cr underlayer can act as an adhesion layer. Moreover, texturing is also effective to give a peripheral anisotropy to the magnetic layer in addition to miniaturizing of the magnetic grains. The texturing is preferably carried out at a surface roughness of less than 2 nm, as recited in amended claim 1.

In the Cheng et al. '859 reference, the magnetic disk uses a rigid substrate such as aluminum or its alloy. The Cheng et al. '859 reference is silent concerning a glass substrate and its utility when combined with texturing. The magnetic disk does not contain a Cr underlayer as an adhesion layer. Further, the NiP underlayer is formed using conventional plating techniques, and not sputtering.

In the Ishikawa et al. '343 reference, the magnetic disk neither has a sputtered NiP underlayer, nor a Cr adhesion layer. The Ishikawa et al. '343 reference teaches only texturing, but not with respect to the combination of a textured NiP underlayer, a Cr adhesion layer, and a glass substrate.

Since there is no motivation to combine the above features to complete the present invention because the cited references are distinguished in their essential features from the present invention, withdrawal of the §103 rejection of claims 1, 2, 5, 9 and 12 is respectfully requested.

Claim 3 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. ('380) in view of Ishikawa et al. ('343) and Cheng et al. as applied above, in further in view of Ishikawa et al. (U.S. Patent No. 6,057,021). Applicants believe that the Chen et al. '380 reference is incorrectly identified as the Chen et al. '890 reference as discussed above. Furthermore, Applicants believe that the Cheng et al. reference refers to the Cheng et al. '859 reference recited above.

Since claim 3 ultimately depends upon claim 1 it necessarily includes all of the features of its associated independent claim plus additional features. Thus, Applicants submit that the §103 rejection of claim 3 has also been overcome for the same reasons mentioned above to overcome the rejection of independent claim 1. Accordingly, Applicants respectfully request that the §103 rejection of claim 3 also be withdrawn.

Claims 6-7 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. ('380) in view of Ishikawa et al. '343, Cheng et al. '859, and further in view of Okuyama et al. (JP 09293227 A). Since claims 6-7 ultimately depend upon claim 1, they necessarily include all of the features of their associated independent claim plus additional features. Thus, Applicants submit that the §103 rejection of claims 6-7 has also been overcome for the same reasons mentioned above to overcome the rejection of independent

claim 1. Applicants respectfully request that the §103 rejection of claims 6-7 also be withdrawn.

Claims 1-2, 5, 9 and 12 stand rejected under 35 U.S.C. 103(a) as being obvious over Chen et al. '890 in view of Chang et al. (U.S. Patent No. 5,879,783), and Ishikawa et al. '343. The reasons recited above with respect to the rejection of these claims based on the Chen et al. '890, Cheng et al. '859, and Ishikawa '343 references are reinserted herein. That is, these references, taken alone or in combination, do not disclose or suggest, among other things, a magnetic recording disk which includes a magnetic recording layer which has a H_c ratio of a perpendicular coercive force $H_c \perp$ to a horizontal coercive force $H_c //$ that is not more than 0.22. For these reasons, withdrawal of the §103 rejection of claims 1-2, 5, 9 and 12 is respectfully requested.

Claim 3 stands rejected under 35 U.S.C. 103(a) as being obvious over Chen et al. '380, in view of Ishikawa et al. '343, Chang et al. '783, and further in view of Ishikawa et al. (U.S. Patent No. 6,057,021). Since claim 3 ultimately depends upon claim 1 it necessarily includes all of the features of its associated independent claim plus additional features. Thus, Applicants submit that the §103 rejection of claim 3 has also been overcome for the same reasons mentioned above to overcome the rejection of independent claim 1. Therefore, Applicants respectfully request that the §103 rejection of claim 3 also be withdrawn.

Claims 6-7 stand rejected under 35 U.S.C. 103(a) as being obvious over Chen et al. '380 in view of Ishikawa et al. '343, Chang et al. '783, and further in view of Okuyama et al. '227 A. Since claims 6-7 ultimately depend upon claim 1, they necessarily include all of

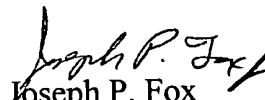
the features of their associated independent claim plus additional features. Thus, Applicants submit that the §103 rejection of claims 6-7 has also been overcome for the same reasons mentioned above to overcome the rejection of independent claim 1. Applicants respectfully request that the §103 rejection of claims 6-7 also be withdrawn.

For all of the above reasons, Applicants respectfully request reconsideration and allowance of all pending claims. The Examiner should contact the undersigned attorney if an interview would expedite prosecution.

Respectfully submitted,

GREER, BURNS & CRAIN, LTD.

By


Joseph P. Fox
Registration No. 41,760

July 21, 2003

300 South Wacker Drive - Suite 2500
Chicago, Illinois 60606
Telephone: (312) 360-0080
Facsimile: (312) 360-9315
Customer Number 24978
K:\2803\62981\Amend F.doc